READ ABOUT SCIENCE 9

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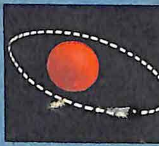
RADIOACTIVITY



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RADIO-ACTIVITY

In many modern laboratories and in nuclear power stations you may often see notices saying:

DANGER—RADIO-ACTIVITY!

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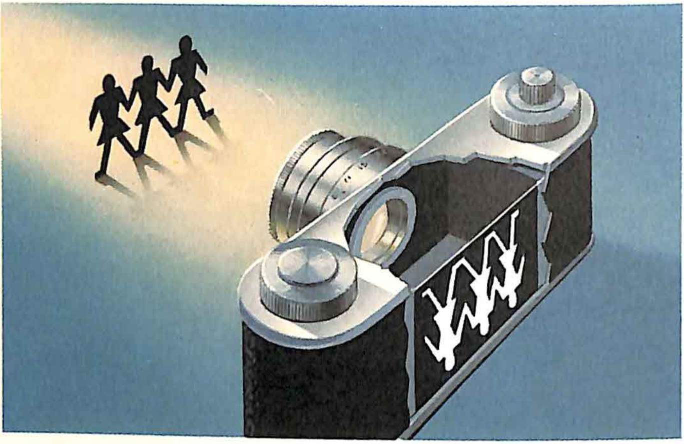

What is radio-activity, and how do we know when a substance is radio-active?

Think of a camera. When the shutter is opened, light rays stream in and hit the film. These light rays blacken the film and give us our "negative" picture.

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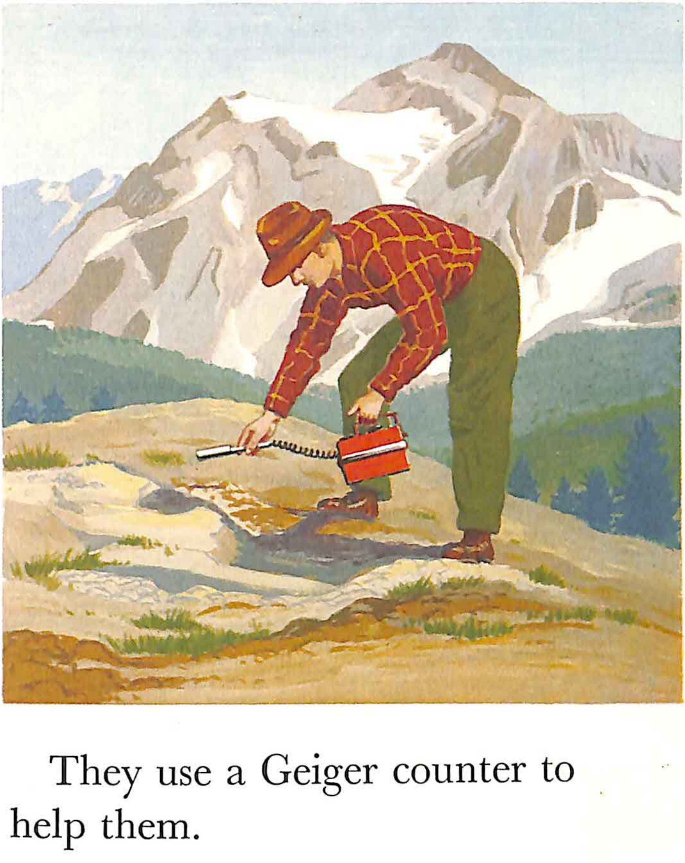
In 1896 the French scientist Madame Curie discovered that some rocks, which had been dug out of the ground, sent out mysterious rays.

These rays are able to blacken photographic films, just as light rays do in our cameras.

Rocks and other substances which give off these rays are said to be radio-active.

The rays sent out by radio-active substances are very powerful. Unlike light rays, they can pass through sheets of metal, and can harm our bodies if we are in their way.

Scientists now know a great deal about these rays. They can detect them with an instrument called a Geiger counter. As radio-active substances are very valuable, scientists search for radio-active rocks.

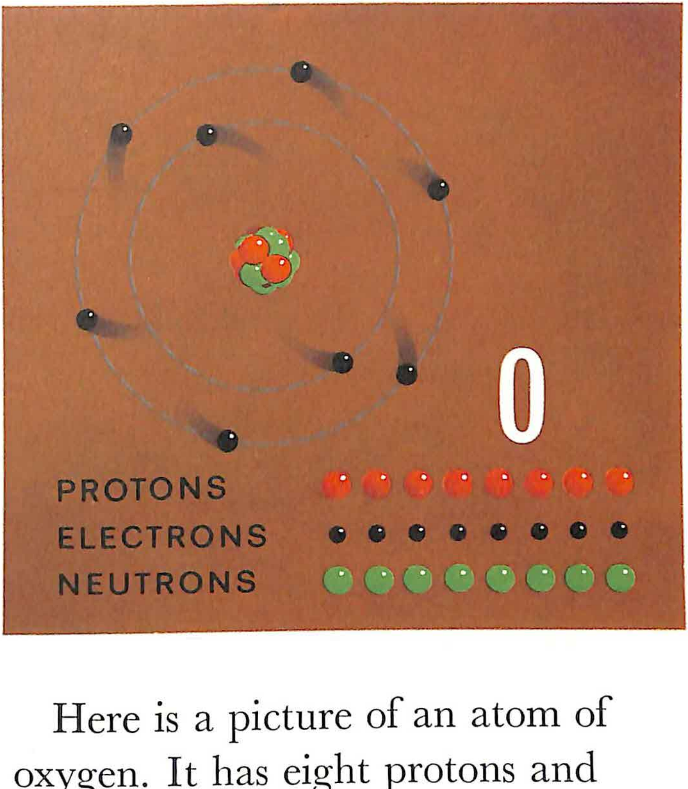


They use a Geiger counter to help them.

Why do some substances give off rays? To answer this question, remember what an atom looks like. It has a main central core called its *nucleus*. Around the nucleus move the *electrons*, just as the planets move around the Sun.

The nucleus is the heaviest part of the atom. It is made up of particles called *protons* and *neutrons*. Each nucleus has a certain number of protons and neutrons in it.

These particles are held together by forces which are not yet properly understood.



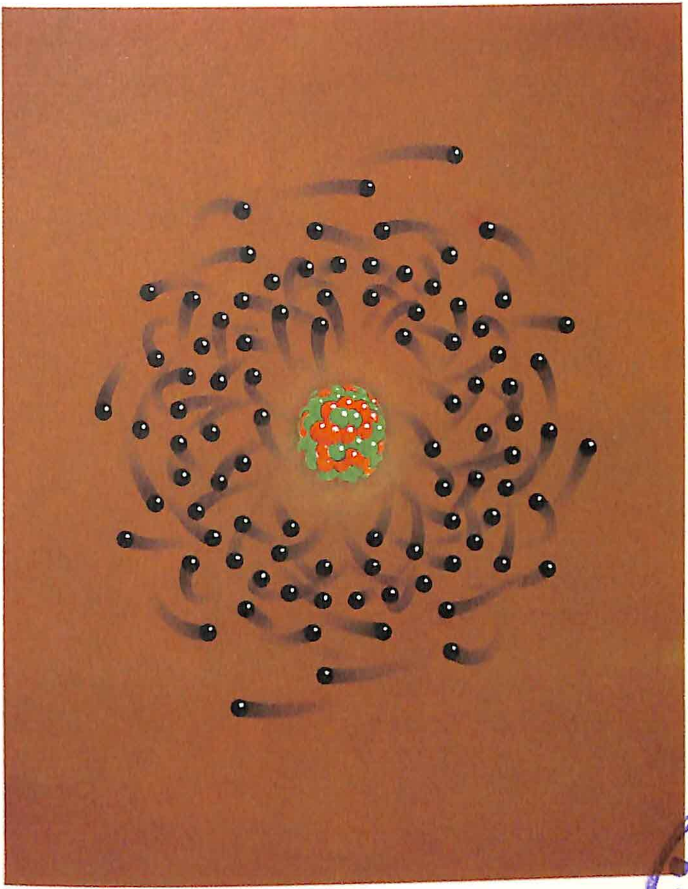
Here is a picture of an atom of oxygen. It has eight protons and eight neutrons in its nucleus.

In oxygen, and in many other atoms, the nucleus is happy with its number of particles. Left to itself, it will not alter.

But in some atoms, the nucleus is overcrowded with particles. The nucleus then bursts open and sends out unwanted particles and rays.

These unwanted particles and rays are the rays which blacken films and set off Geiger counters.

Here is a picture of an atom of uranium. Uranium is a very valuable radio-active substance.



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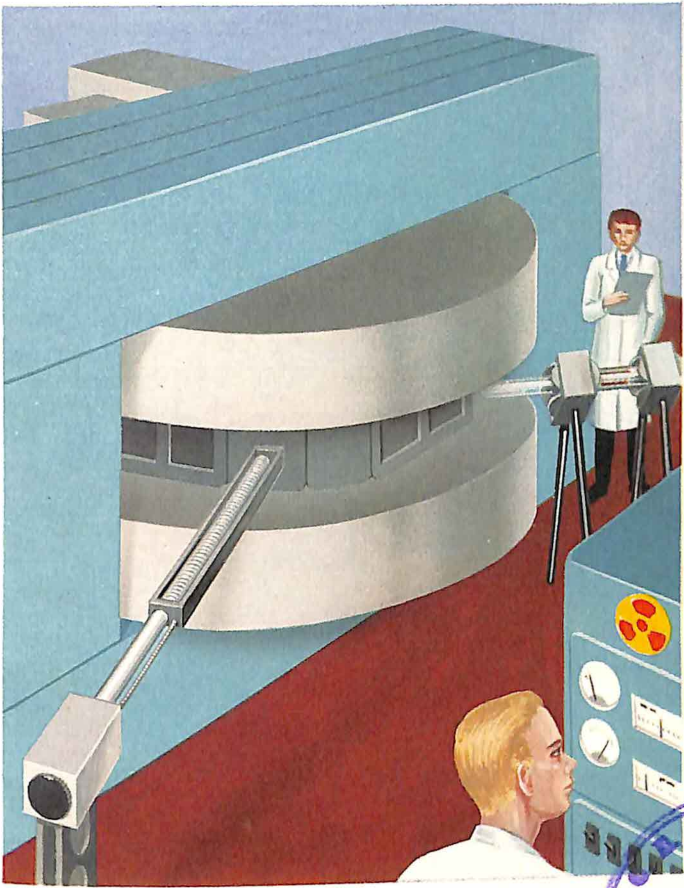
Although uranium is very valuable, nowadays scientists can make any substance radio-active.

To do this they fire atomic particles at the substance with atom-smashing machines.

Substances made radio-active in this way are called radio-isotopes, or just isotopes.

Why are radio-active substances so valuable? They are valuable because they can be used in so many different ways in medicine, in botany, and in industry.



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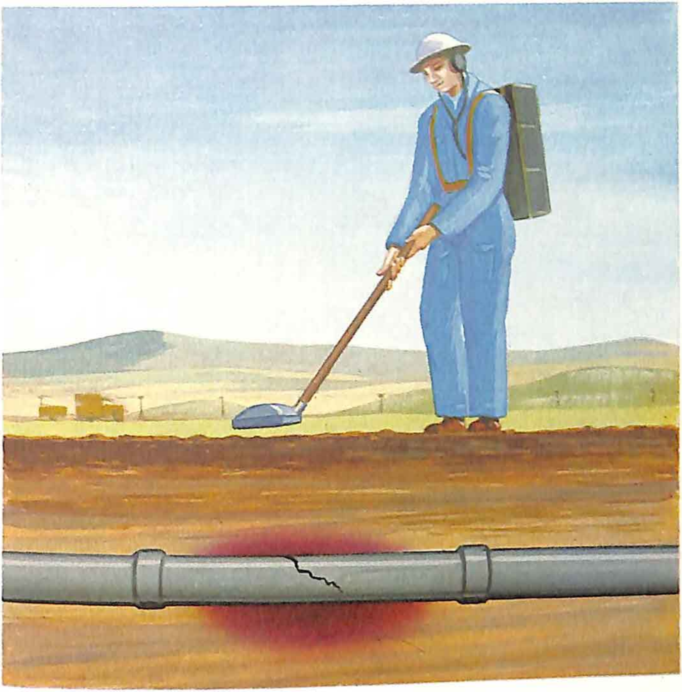
Suppose a leak has developed in a mile-long water-pipe buried deep underground. Before the discovery of radio-active isotopes it would have been very difficult to find it.

Men might have dug for months in the wrong places before the leak was discovered.

Today a small amount of a radio-active isotope is passed through the pipe. The pipe is then cleaned to remove all the radio-active substance. Some of the radio-active substance will have leaked into the soil around the broken pipe.

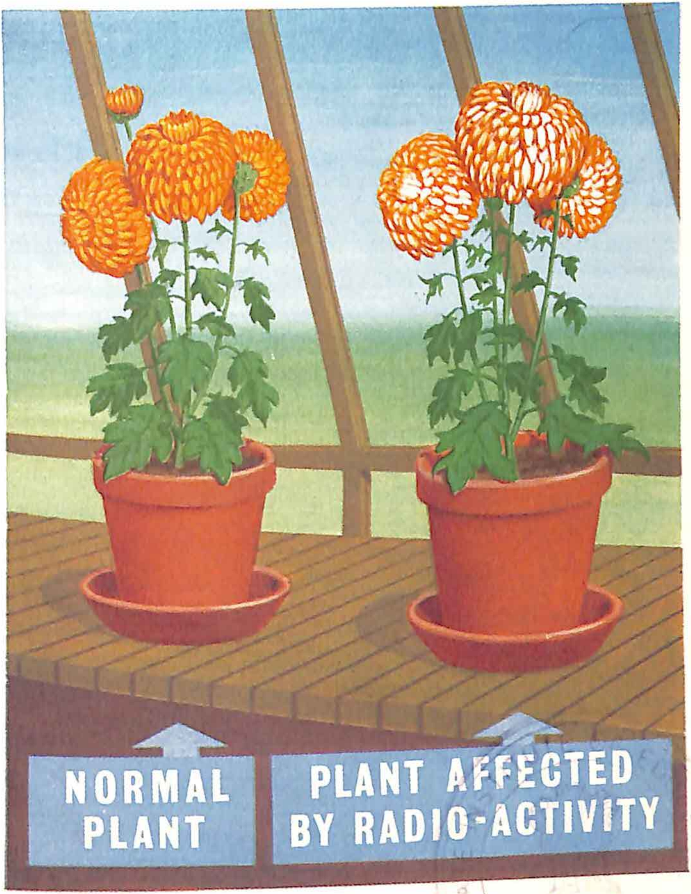


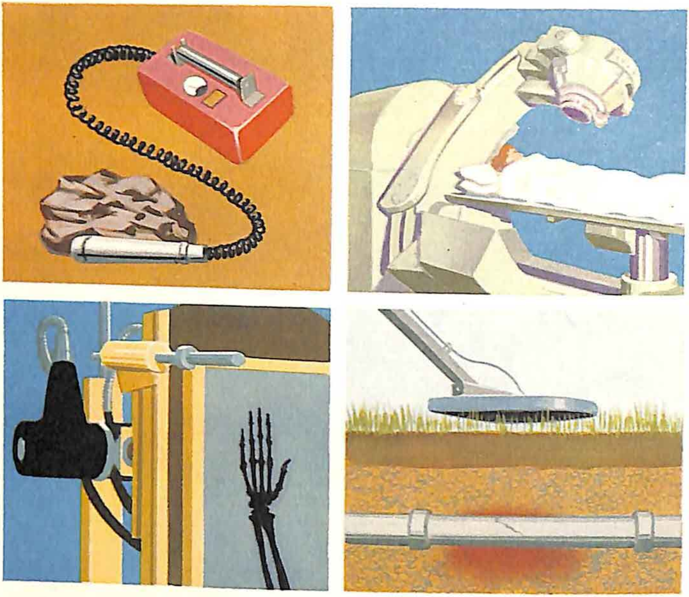
The position of the break can
then be found with a Geiger counter.

Just as the engineer can detect the broken pipe with a Geiger counter, so a doctor in a hospital can check on the flow of blood in his patient's body. Isotopes can help doctors in many ways.

The rays from radio-active substances can also be used to produce changes in the cells of living things. Man can now cause plants to flower earlier than usual by bombarding the plant with rays.

Seeds which have been affected by rays often produce plants with unusual-coloured flowers.


NORMAL PLANT
PLANT AFFECTED BY RADIO-ACTIVITY



Scientists are still learning more and more about radio-activity, and how we can use it in our everyday lives.

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